National Aeronautics and Space Administration

Roundup

LYNDON B. JOHNSON SPACE CENTER

March | 2012

THE FIRST 50 YEARS

50

JOHNSON SPACE CENTER

Poised for greatness

NASA/STAFFORD JSC2011E217129

On the cover:

Geologist Brent Garry of the Planetary Science Institute in Tucson, Ariz., investigates a mock asteroid in the Space Vehicle Mockup Facility.

IMAGE CREDIT: NASA/BILL INGALLS

Photo of the month:

A United States Marine Corps helicopter is seen flying through this scene of the full moon and the U.S. Capitol on Feb. 7 from Arlington National Cemetery.

Guest Column

NASA/PHOTO

One of the goals in our strategic plan is "Lead internationally." I think this goal is critical to our success as a nation, an agency and a center. Of course, foreign relations and international politics have always played a key role in human spaceflight. In the Apollo era, during the height of the Cold War, it was about competition between countries. Who could make it to the moon first and demonstrate superior technical prowess?

The International Space Station came to be during a different era. The wall had come down and there was much more interest in partnerships versus competition. In my opinion, one of the space station's greatest achievements is its incredible team of international partners (15 of them at last count). Because of this teamwork, the program has accomplished great things. The United States has successfully led the formation of these partnerships, first through the long process of assembling a world-class orbiting laboratory in space, and now with international utilization of the station. It is a very visible demonstration of how we can work together internationally to the benefit of all.

It is my firm belief that the success of new human spaceflight endeavors depends upon international collaboration. The 2010 Authorization Act lays out a plan to build both a new rocket (the Space Launch System) and a new human spacecraft (Orion). These are critical building blocks to achieving our mission of exploring beyond low-Earth orbit and are hugely important to us. However, the authorization bill does not promise additional money to take the next steps—whether that is landing on Mars, setting up a base in cis-lunar space or exploring a near-Earth object. And unfortunately, it is hard to imagine that NASA will receive an unexpected windfall in this economy. One obvious answer is to work with international partners, as we have done so successfully with station, to do what may cost too much for any one individual country. This does not mean taking U.S. jobs and shipping them overseas, nor does it mean giving up a leadership position in human spaceflight. Quite the opposite. This means partnering with other nations who can fund and bring their own contributions to further the aims of all parties. It means leading a team to greater accomplishments than each individual could obtain on their own.

Therefore, one of Johnson Space Center's goals is to help the agency lead internationally, both by continuing the international partnerships on station and helping to define new partnerships that make sense. Along these lines, Orion is working with the European Space Agency to define possible contributions to the Orion spacecraft. We have people supporting the agency global exploration roadmap and defining mutually beneficial international contributions to the exploration mission. We are looking to pursue international collaboration on exploration technology development. In short, we want to help develop international partnerships that advance human spaceflight and human exploration. I think this is the best way to achieve the goal that we all seek—to continue human spaceflight exploration and new advancements.

Mike

In this edition . . .

ISS Science Corner

by Lori Meggs
NASA's Marshall Space Flight Center

'We are the Champions' on the International Space Station

In high school, there are champions of football and basketball and even music, but not many students can say they are champs on the International Space Station. However, Alliance Rocket students from the United States and virtual participants Alliance CyberAvo, representing schools in Germany and Italy, have now earned that distinction.

Both teams were named the winners in the third annual NASA-sponsored Zero Robotics Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES) Challenge competition for high school students from the United States and abroad.

NASA, the Defense Advanced Research Projects Agency and the Massachusetts Institute of Technology (MIT) in Cambridge sponsored the competition, which challenged students to write software code for small satellite robots on the station.

"This competition helps to build critical engineering skills for students, such as problem solving and teamwork, and helps us to find future scientists and engineers to work in space," said Leland Melvin, NASA associate administrator for Education at NASA Headquarters in Washington. "The teams this year did not disappoint. The students were exceptional with their designs and flight programs."

PHOTO: MIT/LITANT

Current and former astronauts on hand for the third annual Zero Robotics SPHERES Challenge competition included, from left: Leland Melvin; John Grunsfeld; Richard Garriott, who traveled to the space station aboard a Russian Soyuz capsule; Jeff Hoffman; and Greg Chamitoff. The astronauts shared their space experiences with the student audience.

Last fall, qualifying and semifinal tournaments were run by computer simulation at MIT. On Jan. 23, the finals were played 240 miles above the Earth aboard the station using robotic, bowling-ball-sized SPHERES. SPHERES are used inside the space station to test autonomous rendezvous and docking maneuvers. The free-flying satellites are self-contained with power, propulsion, computers and navigation equipment.

For this competition, NASA uploaded student-developed software to the SPHERES, including code written by the top 36 teams from the fall 2011 competition. Astronauts Don Pettit and Andre Kuipers, who currently live and work aboard the station as part of Expedition 30, presided over the event and gathered data from the student-controlled SPHERES flight programs after each phase of the competition. During a simulated mission, the teams completed a special challenge inspired by future satellite technologies, such as formation flight and close proximity operations. Student finalists were able to watch their flight program live on NASA TV.

PHOTO: MIT/LITANT

Three satellites fly in formation as part of the SPHERES investigation.

Both winning efforts consisted of three teams. The teams that made up Alliance Rocket were Team Rocket, River Hill High School, Clarksville, Md.; Defending Champions, Storming Robots, Branchburg, N.J.; and SPHEREZ of Influence, Rockledge High School, Brevard County, Fla. Alliance CyberAvo consisted of CyberAvo, I.T.I.S. Amedeo Avogrado, Turin, Italy; Ultima, Kaethe Kollwitz Oberschule, Berlin, Germany; and Lazy, Heinrich Hertz Gymnasium, Berlin, Germany.

The winners were awarded certificates and a SPHERES flight patch that previously had been flown to the space station.

More information on past, ongoing and future space station research activities, including research results and publications, is available on Twitter: @ISS_Research

NASA/PHOTO ISS014E17874

Two hundred high school students pack an auditorium at MIT in Cambridge on Jan. 23 for the Zero Robotics SPHERES competition to program miniature satellites aboard the station.

Ongoing construction supports Johnson Space Center's mission

By Steve Farley

What is all that construction activity I see outside my office window? Why is there so much orange fencing, piles of dirt and heavy equipment around site?

These are all signs of progress.

Having been built in the early 1960s, Johnson Space Center's infrastructure has aged and is in great need of replacement and upgrading. JSC has many construction projects under way to make this happen.

One of the most visible projects is the Building 12 renovation. The new-to-us Building 12 is expected to be completed in June. The revamped structure will have an open-office concept to improve workflow and day lighting. The building was designed to meet or exceed Leadership in Energy and Environmental Design gold certification criteria, and will do that and more with an innovative green roofing system—a first for JSC. Also, alternative energy sources will be relied on with the installation of photovoltaics and vertical helix wind turbines.

NASA/PHOTO

While construction isn't pretty, it makes way for progress. This is a rendering of Building 12 when construction is complete, outfitted with JSC's first green vegetative roof.

NASA/BLAIR JSC2011E219526

No, that is not the ground—it is Building 12's budding new roof, complete with 71,000 small plants that make up the cover.

Less glamorous but also very visible on site are some of our utility upgrades, which include the Utility Tunnel Flood Mitigation Project and two Potable Water Distribution System Replacement Projects. The Utility Tunnel Floor Mitigation Project will minimize water infiltration into the JSC Site Utility Tunnel System and improve water removal measures in the event of a hurricane. Not only that, the mission-critical facilities in the Building 30 complex and Building 48 will receive flood-protection upgrades.

The two Potable Water Distribution Replacement Projects will provide new potable and fire-water systems for JSC. These two projects will replace the current transite piping systems at the center. This replacement will provide a faster turnover of water because of smaller piping diameters that are optimized for the demand. The enhancements will also supply better water quality to JSC, which will require less system flushing for maintenance. The replacement of the piping allows for a more physically flexible Polyvinyl Chloride system that will have fewer leaks and breaks during the shrinking and swelling cycles that occur in our high-clay soils. This combined effort will reduce water usage at JSC.

Hurricane Ike led to JSC replacing 60 percent of the roofs at the center. The Building 5 roof replacement is a continuation of this venture and another cost-effective way JSC is conserving natural resources. The new roof will be comprised of thicker insulation and a reflective cap sheet, which will save air conditioning and related energy usage by 40 percent and reduce demand during peak periods for the facility. Construction is scheduled to be complete by May.

The heart and soul of the center depends on the reliability of our central heating and cooling plants. Upgrades in our two central plants, Buildings 24 and 28, are increasing capacity and reliability. The Repair and Upgrade of the Central Heating and Cooling Plant Building 24 Project will replace the original chiller from the 1960s. One of seven total in the plant, this chiller is a 2,000-ton steam turbine unit that cools the JSC main campus buildings. The project also includes significant upgrades in controls and monitoring for the unit and the plant. The expected completion date is March 2013.

The Auxiliary Chiller Facility, Building 28, will enjoy a third electric-drive chiller and associated cooling tower. Located on the east side of the JSC campus, this facility augments chilled water production from the Central Heating and Cooling Plant in Building 24. Because JSC's site-cooling load has increased with additional buildings, extra chilled water production is needed. The third chiller will help cool JSC mall buildings and improve efficiency at partial-load conditions. This project is in its final phase.

The completion of these construction projects will not only invigorate our site, they will enable us to provide continued support to JSC and NASA's mission to lead human space exploration; lead internationally; excel in leadership, management and innovation; and expand the relevance of space exploration to life on Earth.

Suited for space

Spacewalkers of the future to rely on technology being incubated now

By Catherine Ragin Williams

When our astronauts set foot on alien surfaces such as a near-Earth object or the surface of Mars, it will be in part because Advanced Exploration Systems (AES) spacesuit teams have paved the way for the explorers' spacesuit boots.

The Z-1 prototype spacesuit and Portable Life Support System (PLSS) 2.0 test article are undergoing a battery of tests to make way for their successors—future iterations that will be tested in a human-rated thermal vacuum chamber and eventually beyond.

Z-1: A mobility marvel

The Z-1 is a rear-entry prototype spacesuit that represents a potential soft exploration extravehicular activity (EVA) suit configuration, though its description "is a bit of a misnomer," said Spacesuit Engineer Kate Mitchell. "The suit actually contains several hard mobility elements. The term 'soft' is intended to convey the idea that the primary structures of the suit are pliable fabrics when unpressurized."

This prototype suit is the first in a series being developed under the AES suit project.

"The goal is by the 2014/2015 timeframe to have a new vacuum-compatible exploration-type suit," Mitchell said. "The Z-1 was developed as a test bed to go and test various technologies and mobility joints so we can further define our architecture going forward."

NASA/STAFFORD JSC2012E030486

The Z-1 is a prototype spacesuit—the first in a series being developed under the AES suit project.

What is learned from the first iteration of the spacesuit will be harvested for Z-2, the next-generation prototype.

"The data we're gathering now will feed tools that will help us build better suits in the future," said Amy Ross, lead of the Space Suit Assembly Technology Development team.

It's a big deal for the group, because this kind of designing, building and testing hasn't been done for about a decade.

"We haven't built a new flight system since the EMU (Extravehicular Mobility Unit)," Ross said. "The last major prototype we developed was in 1992."

The other major milestone is getting the hardware to the fidelity needed to test in the human-rated thermal vacuum chamber.

"We haven't done that with a prototype suit since the shuttle suits," Ross said. "We're really learning a lot."

One of the sophisticated concepts going forward involves suitport operations. Suitports enable the suited astronaut to attach to the back of a rover, as oftentimes seen in Desert Research and Technology Studies demonstrations.

"To enable suitport operations, the suit has to be able to equalize with the cabin pressure," Mitchell said. "If the cabin pressure of the rover is 8.3 psi, we'd have to have a suit that would be able to operate at that pressure in order to get out the door."

The technology required for suitport operations also benefits astronauts another way—shorter prebreathe times.

"It's less prep time," Mitchell said, which means astronauts can spend more time exploring other worlds than preparing for their spacewalks.

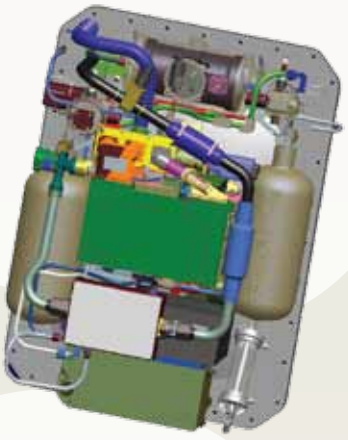
NASA/STAFFORD JSC2012E030490

Test subject Jason Norcross demonstrates the increased mobility of the Z-1 spacesuit.

PLSS 2.0: No ordinary backpack

The PLSS is a backpack on the spacesuit that, in conjunction with the Pressure Garment, carries out all life-support functions for the crew member. Those functions include providing oxygen, removing carbon dioxide and trace contaminants, providing ventilation flow and cooling the crew member and onboard electronics.

"Our group is developing a new advanced technology PLSS that aims to be more robust, less sensitive to contamination, use less consumables and provide increased capabilities as compared with the current EMU PLSS," said PLSS Engineer Carly Watts.



Shown in this graphic is the organization of the PLSS 2.0 backpack, where all life-support functions are located on a suited astronaut.

PLSS 2.0 is the group's first attempt to package the backpack with components in a flight-like configuration. Last year's project, PLSS 1.0, "was where we tied all of our developmental components together with commercial off-the-shelf hardware to simulate the full functionality of the advanced PLSS design in a bench-top environment," Watts said.

This new PLSS has been a long time coming, but the wait will be worth it.

"We have been operating the EMU PLSS on orbit for 30 years now, and because it was developed prior to that, the technology is 40 years old," Watts said.

The older components are being switched out. For example, the

(continued on page 11)

RATS 2012:
Asteroid simulation mission

Compiled by Neesha Hosein

NASA's Research and Technology Studies (RATS) team was in action once again as the group conducted initial testing to prepare for an integrated test this summer. The team created a simulated near-Earth asteroid (NEA) exploration mission in the Space Vehicle Mockup Facility at Johnson Space Center in December 2011 and January 2012.

The team performed two three-day human factors studies of the new multi-mission Space Exploration Vehicle (SEV) cabin, in addition to conducting simulated asteroid spacewalks using several different facilities at JSC. The SEV is being designed to have a flexible architecture, allowing it to rove on a planetary surface atop a wheeled chassis or fly in space using advanced in-space propulsion systems.

The JSC facilities used for the simulated spacewalks included the Virtual Reality Lab, the Active Response Gravity Offload System (ARGOS) and the Manned Maneuvering Unit trainer, or "air chair." Testing occurred Dec. 13 to 15 and Jan. 18 to 20.

December test participants were NASA astronaut Michael L. Gernhardt, Ph.D., manager of Environmental Physiology Laboratory, principal investigator of the Prebreath Reduction Program and SEV project manager; and Brent Garry, Ph.D., geologist at the Planetary Science Institute. January participants were NASA astronaut Alvin Drew Jr. (Col., United States Air Force, retired); and José M. Hurtado Jr., Ph.D., professor of physical geology, field geology, remote sensing, tectonic geomorphology and planetary science at the University of Texas at El Paso.

The action plan

For three days and two nights during the simulations, the two-person crews lived, worked, ate, slept and exercised in the SEV cabin. Throughout the day, they traded responsibilities as extravehicular activity (EVA) and intravehicular crew members. During the spacewalks, the crews performed a variety of simulations using the suitports on the aft end of the SEV to exit the vehicle. These simulations were conducted for two reasons: 1) to provide a realistic level of crew activity to effectively evaluate the use of the new SEV cabin, and 2) to study how various systems and facilities at JSC might be used for future asteroid simulations.

NASA/STAFFORD JSC2011E217099

Various stations of rock setups are in place to practice gathering geologic samples in another world.

Conducting the test at JSC enabled the RATS team to use a medley of tools and simulators that would be difficult to transport to traditional field-test locations. A high-fidelity, physics-based NEA simulation was a key component of the test and was integrated with the SEV's control system and projected on a large screen in front of the vehicle. In addition to the NEA simulation, the Virtual Reality Lab was engaged to provide an immersive environment for the spacewalk crew members with integrated, real-time graphics from the NEA simulation and modeling of crew member motions and kinesthetic sensations. The Air Bearing Floor was another technology that allowed the crew to test the SEV in

NASA/PHOTO JSC2011E074815

From inside the mock SEV, RATS crew members evaluate their asteroid target.

NASA/STAFFORD JSC2011E215925

Asteroid simulation is in progress as team members monitor the activity.

a "flying" configuration on an air sled, rather than as a rover on wheels. The ARGOS facility provided additional spacewalk simulation capability by allowing the crews to conduct sample collection and translation activities in a simulated microgravity environment. Last, the air chair allowed the crew to simulate how a jet pack might operate in microgravity and gain an awareness of the reaction forces one might expect when working on an asteroid surface.

"What we're doing here today is very interesting," Gernhardt said. "We worked with the engineering team here at NASA, and we developed this really great integrated (simulation) where we're actually living in the Generation 2A Space Exploration Vehicle."

NASA/STAFFORD JSC2011E217197

The Virtual Reality Laboratory is an immersive training facility at JSC.

Gernhardt explained that they actually flew around the simulated asteroid and did a near-field survey, flying off the surface and focusing on a 100-foot diameter area of interest. This allowed the team to gain an understanding of how we may one day operate in close proximity to an asteroid surface and measure the handling quality of the SEV.

"Tests like this one allow us to demonstrate new technologies, such as the SEV, while learning how we intend to operate them," said test coordinator James Johnson. "Ultimately we have to develop our operational concept in parallel with the technology that will make that concept a reality."

Through the Virtual Reality Lab, the NEA simulation was able to integrate with the Simplified Aid for EVA Rescue (SAFER) jet pack simulation. The SAFER is used on space station spacewalks in case astronauts become untethered, providing a way to fly back to safety, and its operation is frequently trained in the Virtual Reality Lab. Having the SAFER and NEA simulations incorporated allowed one crew member to be on a jet pack flying around the asteroid surface while the other was in the vehicle monitoring them. This type of coupling provides an understanding of what it might be like to work on and around an asteroid.

The particular asteroid NASA will first visit hasn't been chosen yet, but engineers are developing tools that will allow optimization of the hardware depending on the characteristics of the asteroid.

What else are they looking at?

Another aspect of the study was to evaluate the mechanics and human factors of suitports. Suitports allow a crew to conduct a spacewalk with significantly shorter prebreathe time as compared to current station spacewalks. Every time the crew exited the vehicle, they got into a mock-up spacesuit through the second generation suitport. This occurred four times a day during four one-hour spacewalks.

The ARGOS worksite had a number of different sampling sites set up, allowing the team to evaluate different translation lines, lightweight booms and geologic sampling techniques using a test protocol that was exercised during the NASA Extreme Environment Mission Operations (NEEMO) 15 analog mission. By repeating similar tests here at JSC with ARGOS, the NASA's Analog Missions team was able to validate some of the concepts that the NEEMO mission exercised.

"It is this kind of synergy between each of NASA's analog missions that help the agency gain a better understanding of future mission technologies, architectures and operational concepts," said Analog Missions Project Manager Barbara Janoiko.

"In the attempt to research various ways to explore an asteroid, we're looking at all aspects of that," Gernhardt said. "Right now our basic plans are to have a deep-space habitat (in which) we'd actually travel to the asteroid. Once we get there, we would transfer to the smaller space exploration vehicle and travel over to the asteroid and stay there for a week at a time."

Why are geologists involved?

Professional geologists are a part of the team to help score how productive the studies are in conducting simulated science operations. The presence of geologists is important because future exploration of the moon, Mars, asteroids and more will likely have a significant focus on understanding the local geology.

"I think it's very important to engage the scientific community in this evolving process so that we can do the best science we can when we get there," Gernhardt said.

With RATS missions, an astronaut is teamed up with a geologist to help learn geology and provide important operational background on how the mission is conducted.

NASA/STAFFORD JSC2011E217255

A mock SEV is shown in the "flying" configuration, mounted on an air sled, moving across the air-bearing floor.

Human **test subjects** play a role in research

By Neesha Hosein

Test Subject Screening (TSS), formerly known as the Human Test Subject Facility, is a JES Tech sub-contractor for Wyle Human Performance and Engineering within the Clinical Services Branch in Space Life Sciences at Johnson Space Center that gives qualified team members the opportunity to participate firsthand in research activities.

Humans are needed as control subjects to test equipment that will be flown to collect medical/exercise data, or to collect scientific data of the body's response to the study protocol to compare to the astronaut data from flight. Information gained from study data helps to refine the countermeasures employed in spaceflight protocols.

How studies originate

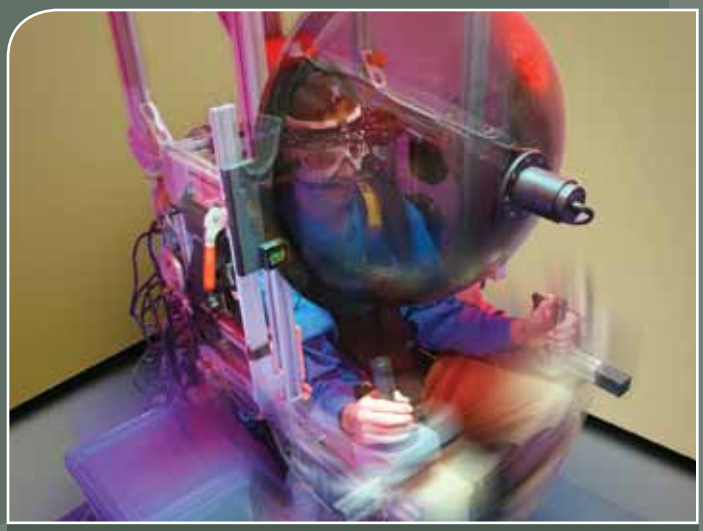
Principal Investigators (PIs) are individuals who create and oversee the study protocols, policy and procedures, obtain approval from the Committee for the Protection of Human Subjects (CPHS) and manage the project and funding. All studies are designed to minimize the effects of microgravity and long-duration spaceflight changes on the human body. PIs are NASA researchers and scientists, engineers, research clinics and universities, professors and graduate students, along with M.D.s and Ph.D.s. The PIs contact the TSS nurses and submit a Test Subject Request Form, a copy of the CPHS approval letter of the study and a copy of the Layman's Summary of the study protocol.

Who are the human test subjects?

TSS nurses recruit potential volunteers and conduct a detailed health interview. If the person qualifies for the active test subject pool, a physical is scheduled. Test subjects are healthy, non-smoking volunteers who must meet stringent guidelines paralleling the astronaut population, and are about 21 to 50 years old. The subjects must pass a yearly physical in the Building 8 Clinic. Some studies will require additional testing after the physical, such as a psychological evaluation or treadmill testing.

NASA/PHOTO

A subject participates in a motion simulation using visual feedback from an instrument display panel in the Tilt-Translation Sled in the Neurosciences Laboratory. Current studies are investigating the perception of ambiguous tilt and translation motion cues and how these affect performance on manual control tasks, such as a Martian landing. Both the Variable Radius Centrifuge and the Tilt-Translation Sled are used to induce motion illusions and spatial disorientation similar to what astronauts may experience during gravitational transitions on space exploration missions.



NASA/PHOTO

A subject is tested in the Variable Radius Centrifuge in the Neurosciences Laboratory to investigate altered gravitational loading. Researchers are investigating motion perception in different motion environments to better understand and assist astronauts before and after spaceflight.

The TSS nurses recruit from a pool of active and qualified test subjects for short-term, ground-based studies at JSC and long-term bed rest studies at the University of Texas Medical Branch in Galveston, Texas.

Research—i.e., astronaut medical training, neurovestibular, exercise physiology, cardiology, pharmacology, nutrition, suit engineering, bone and mineral, and immunology—is conducted in different labs on site.

Ross Winn, a mechanical design engineer at JSC, is also a TSS volunteer who has participated in several studies for three years.

"It's fun because you get to be the lab rat, but you get to learn, too," Winn said. "There's something to be said for that experience and being able to get your hands dirty. It opens your eyes to human capability."

Purpose of the studies

CPHS-approved, ground-based studies are aimed at developing countermeasures to changes occurring in microgravity, prolonged spaceflight and postflight re-adaptation. Researchers and engineers also use test subjects to evaluate and develop procedures on the hardware systems prior to study commencement.

JSC team members who are interested in becoming test subjects can contact Linda Byrd at x37284 or Rori Yager at x37240.

Have a bucket list? Look no further than Power of One

By Catherine Ragin Williams

Striving for excellence is something we aim for ordinarily, but sometimes it is just more fun being awesome when you can get something out of it, too. With the Power of One Award, not only are Johnson Space Center team members recognized for furthering NASA's, JSC's or their organization's mission … they can have a personally tailored, one-of-a-kind experience in exchange for their hard work and dedication.

This peer-nominated, quarterly award has been around since 2010.

"So far we've had nothing but success," said Program Analyst Nicole Kem of the Human Resources Awards Office. "This has been a very cool award. (It was) highlighted as a JSC best practice."

Power of One derives much of its popularity from the experiences from which award winners can choose.

"There are so many things that people do on site that you just don't know about, or how much impact they have," Kem said. "We didn't want to just give them a certificate and a pin, we wanted to give them an opportunity to go and do something they normally wouldn't do. It's different."

Power of One winner Pam Daley, administrative assistant to the JSC Clinic manager, agreed.

"A lot goes on out here that some of us are never exposed to," Daley said, who received a special JSC VIP tour. "I was grateful for the opportunity."

Program Analyst Tom Canning was able to cross off "Special Weapons and Tactics (SWAT) team experience" from his bucket list, thanks to Power of One.

"I've always had a strong desire to work in law enforcement growing up, as a lot of kids do," Canning said. "I joined the United States Marine Corps shortly after high school with aspirations of eventually working in law enforcement; however, the opportunity to work at NASA presented itself … and who would pass on NASA?"

Canning's award experience selection was a direct reflection of his earlier dreams.

"It was rewarding enough to be recognized by my peer for the Power of One Award, and to be able to choose an exclusive NASA experience made the recognition that much more exceptional," Canning said. "The SWAT training experience more than met my expectations. The real weapons training was exhilarating and intense, and it didn't end there. Russ Tucker, security officer with the JSC Special Operations unit, also provided me with the opportunity to see and feel different types of SWAT equipment and explore the SWAT truck (which kind of looks like a taco truck, but believe me, it's not)."

While the list of experiences from which to choose is constantly changing, there is still something for everyone. So go ahead and excel. You have nothing to lose.

For more information, or to nominate a peer for Power of One, visit: https://powerofone.jsc.nasa.gov/

NASA/PHOTO JSC2011E121577

Tom Canning, Power of One silver award winner, gets a taste of SWAT training at JSC.

NASA/PHOTO JSC2011E118415

This could be your chance to visit the NBL facility to view a training session if you choose it as your winning experience with Power of One.

Gold level (NASA impact):
- JSC VIP tour
- Tour of Building 24 and the chance to explore a portion of the JSC tunnels
- A ride on the lunar rover
- The opportunity to shadow a JSC executive for the day
- SWAT team firearms simulator training
- SWAT team training
- T-38 photo opportunity
- A ride on the "Puddle Shuttle"

Silver level (JSC impact):
- Hubble Space Telescope pictures
- JSC VIP tour
- Lunar Sample Lab
- Message display awards
- A ride on the lunar rover
- SWAT team firearms simulator training
- Opportunity to view training session in the Neutral Buoyancy Laboratory (NBL)

Bronze level (organizational impact):
- Interview award
- JSC VIP tour
- Lunar Sample Lab
- Message display awards
- A ride on the lunar rover
- SWAT team firearms simulator training

Spotlight: **Audrey Nguyen**

Space Life Sciences Directorate intern, USRA

Q: Coolest part of being an intern at Johnson Space Center?
A: Having the opportunity to explore so many different and diverse occupations. I've gotten to work with the Space Radiation Analysis Group, Human Research Program and Human Adaptation and Countermeasures Division thus far!

Q: Favorite hobbies or interesting things you do away from the office?
A: Dance, long boarding, reading, volunteering and watching TED (Technology, Entertainment, Design) talks. I also consider myself an arts and crafts enthusiast.

Q: What was your first job (not necessarily at NASA, but ever)?
A: Assistant dance instructor.

Q: If you could trade places with any other person for a week, famous or obscure, living or dead, real or fictional, who would it be?
A: Bruce Wayne (Batman).

Q: What would people be surprised to know about you?
A: For the last three years, I danced as a demi-soloist in a pre-professional ballet company here in Houston.

Q: What is your favorite school subject and why?
A: AP Biology, because it helps me recognize the beauty of life and aids my attempt to make sense of the world.

Q: What is your favorite indulgence?
A: Fro-yo from Pinkberry!

Q: Last good book or article you read?
A: "Nausea" by Jean-Paul Sartre. I'm currently reading "Fight Club" by Chuck Palahniuk.

Q: What cosmic destination would you want to travel to if you were an astronaut?
A: Kepler-20e or Kepler-20f.

Q: What would we find in your refrigerator right now?
A: A variety of fruits and vegetables, whole milk and mi xao (Vietnamese stir fry).

Q: What was your proudest moment?
A: Completing the 10K Mud Run in fall 2011.

NASA/STAFFORD JSC2012E022925

Q: When did you first become interested in space and why?
A: After watching the STS-125 shuttle launch. As I watched the shuttle disappear from sight, I realized how small we are in the grand scheme of things, how much uncharted galactic territory remains and how much there is left to discover.

Q: Describe yourself in three words.
A: Adventurous, ambitious, dependable.

Q: What is the most interesting thing you have learned being in the Space Life Science Directorate (SLSD)?
A: It's hard to choose. I've learned so many incredible things during my time with SLSD. I was introduced to circadian biology, which I find fascinating. I also learned the hard way that the vault door will swing shut on you unless you open it all the way.

Q: JSC turned 50 last September. Where do you hope to see NASA 50 years from now?
A: At the forefront of the space race and breaking barriers in human health research.

PHOTO COURTESY OF AUDREY NGUYEN

WANTED!

Do you know a JSC colleague or team that does something extraordinary on or off the job? Whether it's a unique skill, interesting work, special professional accomplishment, remarkable second career, hobby or volunteerism, your nominee(s) may deserve the spotlight!

The Roundup shines the light on one special person or team each month, chosen from a cross section of the JSC workforce. To suggest "Spotlight" candidates, send your nomination to the JSC Roundup Office mailbox at jsc-roundup@mail.nasa.gov. Please include contact information and a brief description of why your nominee(s) should be considered.

Johnson Space Center hosts **Service Disabled Veteran Owned Small Businesses**

That small businesses fuel our nation's economy is underscored by the fact that our nation's service-disabled veterans further drive America's ingenuity with a spirit of entrepreneurialism, vision and the audacity to sacrifice even still. On Jan. 31, NASA hosted a Service Disabled Veteran Owned Small Business (SDVOSB) Industry Day here at Johnson Space Center. A total of 103 companies, including 56 SDVOSBs and more than 200 attendees, made up the audience at this one-of-a-kind small-business event.

NASA/SOWA JSC2012E022299

NASA/SOWA JSC2012E022292

This occasion highlighted NASA's efforts to partner with these distinctive small businesses and garnered more opportunities to achieve the Office of Small Business Programs' objective for increased SDVOSB participation throughout the agency for Fiscal Year 2012 and beyond.

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EMU PLSS uses a sublimator for its cooling function.

"The sublimator is extremely sensitive to contamination and can only be used in a hard vacuum environment," Watts said.

So that we can keep the Red Planet on our radar, the team is using a new tool called the Spacesuit Water Membrane Evaporator.

"It's a completely different technology that we fostered and developed in house," Watts said. "The design gets the same performance as the sublimator, but it can be used in a Martian environment. It can be frozen without damaging the unit, and it's not particularly sensitive to contamination."

Also on tap is the need for less consumables. The current EMU system requires lithium hydroxide and metal oxide (MetOx) canisters to remove carbon dioxide (CO2). MetOx canisters, in particular, must be "baked" out in an oven on the space station for about 14 hours to be reused again.

"We're looking to replace those capabilities with a Rapid Cycle Amine swingbed," Watts said. "Every few minutes it will cycle and regenerate itself to remove CO2 real time during a spacewalk … so CO2 removal capability will no longer be a consumable."

It also won't be a time-limiting factor, which translates to longer adventures in spacewalking.

Joining forces

The Z-1 and PLSS 2.0 are not yet at the stage where they can merge. But future iterations of the suit and backpack will join forces in the human-rated thermal vacuum chamber, where they will bring us even closer—to flight.

"The AES program has given us the tools to develop advanced EVA systems in a lean environment with low programmatic overhead," said Ben Greene, project manager for Advanced EVA Systems Development. "We intend to take full advantage of that opportunity to push EVA technology farther than it has been in decades."

Last year's project, PLSS 1.0, tied all developmental components together with commercial off-the-shelf hardware to simulate the full functionality of the advanced PLSS design.

NASA/PHOTO

Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Johnson Space Center, Houston, Texas, and is published by the External Relations Office for all Space Center employees. The Roundup office is located at the Johnson Space Center, Building 2. The mail code is AD94. Visit our website at: http://www.jsc.nasa.gov/roundup/online/ For distribution questions or to suggest a story idea, send an email to jsc-roundup@mail.nasa.gov.

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Pettit demonstrates science concepts in 'Science off the Sphere'

By Rachel Kraft

NASA and the American Physical Society (APS) have partnered to share unique videos from the International Space Station with students, educators and science fans. Expedition 30/31 Flight Engineer Don Pettit is using everyday objects from Earth to demonstrate physics through a video series, "Science off the Sphere." Pettit attracted science fans from around the globe during previous stays in space when he performed science demonstrations like the "Zero-G Coffee Cup."

APS, the professional society for physicists, is sharing the "Science off the Sphere" videos through its outreach website, Physics Central, and is hosting a physics-oriented challenge to ignite interest in science, technology, engineering and math. The website also will feature educational content on the physics topics demonstrated in space by Pettit and will facilitate the challenge.

To view Pettit's science demonstrations, visit **http://www.physicscentral.com/sots.**

If you're more a fan of the written word, Pettit is also penning "Letters to Earth," or blog entries, while living aboard the orbiting laboratory. With topics as varied as sorting trash on station to what Pettit envisions missing most about space when back on Earth, visit **http://blogs.nasa.gov/cm/newui/blog/viewpostlist.jsp?blogname=letters.**

NASA/PHOTO ISS030-E-049636

NASA astronaut Don Pettit, Expedition 30 flight engineer, works with two still cameras mounted together in the Destiny laboratory of the space station.